

PROCEEDINGS
OF
THE ROYAL SOCIETY.

1834-1835.

No. 18.

November 20, 1834.

JOHN WILLIAM LUBBOCK, Esq., M.A., V.P. and Treasurer,
in the Chair.

A paper was read, entitled, "On the Determination of the Terms in the disturbing Function of the fourth Order, as regards the Eccentricities and Inclinations which give rise to secular inequalities." By J. W. Lubbock, Esq., V.P. and Treas. R.S.

The author observes, that the magnitude of the terms of the fourth order in the disturbing function, relating to the inclinations, in the theory of the secular inequalities of the planets, does not admit of being estimated *à priori*; and consequently the amount of error which may arise from neglecting them cannot be appreciated. The object of the present investigation is to ascertain the analytical expressions of these terms; and the method adopted for this purpose is derived from principles already explained by the author in a former paper. He has bestowed great pains in putting these expressions into the simplest form of which they are susceptible; and has finally succeeded, after much labour of reduction, in obtaining expressions of remarkable simplicity. He exemplifies their application by the calculation, on this method, of one of the terms given by Professor Airy as requisite for the determination of the inequality of Venus; and arrives, by this shorter process, at the same result. The same method, he remarks, is, with certain modifications, applicable to the developement of the disturbing function in terms of the true longitude.

A paper was also read, entitled "Note on the Astronomical Refractions." By James Ivory, Esq., K.H., M.A., F.R.S.

The object of this communication is to show how far the author has been successful in establishing the true theory of astronomical refractions, in his paper published in the Philosophical Transactions for 1823, by comparing the results of that theory with the best and most recent observations; namely, those recorded in the "Fundamenta Astronomiæ" of Bessel, and the "Tabulæ Regiomontanae" of the same author. This comparison is made by taking the first and second differences of the series of the logarithms of the refractions in each table; from which it results that these differences, derived from the numbers in Bessel's tables, are very irregular; but that their mean very nearly coincides with that of the numbers given in the tables of the author.

November 27, 1834.

DAVIES GILBERT, Esq., M.A., V.P., in the Chair.

A paper was read, entitled, " Meteorological Journal kept at the Royal Observatory, Cape of Good Hope, from the 1st of February to the 31st of May, 1834." By Thomas Maclear, Esq. Communicated by Captain Beaufort, R.N., F.R.S.

The tables of meteorological observations which compose nearly the whole of this paper are preceded by a short notice of the instruments, namely, one barometer and two thermometers, with which the observations were made. The author announces his intention to forward, in a future communication, the results of a comparison between his barometer and that of Sir John Herschel. The observations are taken at sunrise, at noon, at sunset, and at midnight.

The reading of a paper was commenced, entitled, " On the Proofs of a gradual Rising of the Land in certain parts of Sweden." By Charles Lyell, Esq., F.R.S.

At the Anniversary Meeting, December 1, 1834, which was held on that day in consequence of St. Andrew's Day falling on a Sunday,

JOHN WILLIAM LUBBOCK, Esq., M.A., V.P. and Treasurer,
in the Chair,

The Treasurer stated that he took the Chair on the present occasion in consequence of the unavoidable absence of His Royal Highness the President; from whom he had received the following letter:

" Dear Sir,

" May I request of you to express to the gentlemen assembled this day at the Royal Society Rooms, my extreme regret that the state of my eyesight should prevent my attending in my place on the present occasion, as it would otherwise have been both my duty and pleasure to have done? Under these circumstances I must rely upon that kindness which I have ever experienced at their hands since presiding over the interests of the Royal Society, to excuse this involuntary absence on my part. Should the gentlemen kindly vote me again into the Chair, aware as they are of my present infirmities, I can only accept the proffered honour upon an understanding that should I not be better at this period next year, I may be now considered as giving them notice that I shall consider myself bound in duty to resign an office, the duty of which I am no longer able to perform. I regret much being deprived of the pleasure of conferring the medals this day, and particularly the one which has been so properly adjudged to you, for whom I profess the highest consideration, and with which sentiment I subscribe myself,

" Very sincerely, yours, &c.,

(Signed) " AUGUSTUS FREDERICK, P.R.S.

" Kensington Palace, Dec. 1, 1834.

" John William Lubbock, Esq., Treasurer of the Royal Society."

Resolved unanimously,—That this Meeting deeply regrets the affliction which deprives the Society of His Royal Highness's attendance at the Anniversary Meeting, and confidently hope that his health will be speedily and completely restored.

The Rev. Mr. Peacock, as one of the Auditors on the part of the Society, reported that the balance in the Treasurer's hands at the present audit was £192 7s. 6*½*d. The thanks of the Society were voted to the Auditors for their trouble in auditing the Society's accounts.

The Secretary read the following List of Fellows deceased since the last Anniversary.

On the Home List.—Sir Gilbert Blane, Bart., M.D.; John, Marquis of Breadalbane; John Caley, Esq.; Rev. James Stanier Clarke, LL.D.; Captain James Franklin; William Wyndham, Lord Grenville; Philip, Earl of Hardwicke; George Harvey, Esq.; John Jebb, Lord Bishop of Limerick; Rev. Daniel Lysons; William Taylor Monney, Esq.; John Sharpe, Esq.; Thomas Snodgrass, Esq.; William Sotheby, Esq.; George John, Earl Spencer; Thomas Telford, Esq.; Right Hon. Charles Philip Yorke.

On the Foreign List.—Don Felipe Bauzá and Professor Karl Ludwig Harding.

The Secretary stated that of these only two, namely, Sir Gilbert Blane and Mr. George Harvey, have contributed papers to the Royal Society.

Sir Gilbert Blane was the author of a paper, entitled, "An Account of the *Nardus Indica*, or Spikenard," which was published in the Philosophical Transactions for 1790.

In this paper, Sir Gilbert, then Dr. Blane, establishes the identity of a species of grass, found in great abundance in a wild unfrquented part of India at the foot of the mountains north of Lucknow, and held in great estimation by the natives as a febrifuge, with the plant denominated by ancient writers the *Nardus Indica*, and which Arrian states was found in great quantity by the armies of Alexander during their marches through the deserts of Gadrosia, bordering on the Persian Gulf, and forming part of the modern province of Mekran. An account of the medicinal properties of this plant occupies the remainder of this paper.

In the year 1788, Sir Gilbert Blane was appointed to read the Croonian Lecture, in which he enters into a general account of the nature of the muscles and of the theory of muscular motion. This paper was not published in the Philosophical Transactions. The portion of it chiefly deserving notice is that which relates to the experiments made by him with a view to determine whether the specific gravity of a muscle is the same in its two states of relaxation and contraction. For this purpose he compared equal portions of the muscular flesh taken from the opposite sides of a fish, one of which had been contracted by crimping, and the other had remained relaxed; but he was unable to detect any sensible difference in their specific gravities. This conclusion was corroborated by the result of experiments on living eels, inclosed in vessels filled with water,

and terminating above in a tube of small diameter : the bulk of the fluid was observed to be unaffected by muscular contractions purposely excited in the fish, as appeared from the height of the column in the tube remaining unchanged during the most violent actions of the eels. In caoutchouc, on the other hand, Sir G. Blane found that extension produced a diminution, and retraction an increase, of density.

Mr. George Harvey was the author of a paper entitled " Experimental Inquiries relative to the Distribution and Changes of the Magnetic Intensity in Ships of War;" and of another " On the Effects of the Density of Air on the Rates of Chronometers;" both of which are published in the Philosophical Transactions for 1824. In the first paper he enters into a detail of experiments made on board several vessels for the purpose of determining the influence of the iron in the ships upon the mariner's compass in different situations and under different circumstances. In the second paper he ascertains that the rate of chronometers is accelerated by being placed in air of diminished density; and that it was, on the contrary, retarded when they are subjected to increased atmospheric pressure; the arc of vibration being, in the former case, increased; and in the latter, diminished.

The Secretary then read the following Report :

The Council appointed by the Royal Society for the management of their affairs during the past year, conceiving, from the Report on the state of the finances presented by the Treasurer to the last Anniversary Meeting, that their earliest attention should be directed to this important subject, lost no time in nominating a Committee for taking it into consideration, and for devising the most eligible means of obviating the difficulties into which the Society might eventually be involved by the continuance of the present excess of their expenditure over their income. It appeared from that Report that the clear annual income of the Society, exclusive of payments made by new members, may be estimated at £1400; while the probable annual amount of ordinary expenses is £2000; leaving a deficiency, each year, of £600. By adopting a system of greater economy in the mode of arranging and printing the Transactions, and other measures of retrenchment, recommended by this Committee, the Council expect that in future this annual deficiency may be reduced to little more than £200. By an arrangement which they have made with the Editor of the weekly journal "The Athenæum," the expense of printing the Meteorological Tables, formerly appended to the Philosophical Transactions, and amounting to £26 annually, will be saved; the Editor, in consideration of their being given to that journal exclusively, having agreed to deliver a thousand copies of those tables, printed in manner and form, and on paper, to correspond with the Transactions, every six months, to be bound up with the latter, free of all cost to the Society.

With a view to improve the permanent resources of the Society,

all the sums received on account of compositions for annual payments are in future to be invested in the funds. In the present year, however, this principle cannot be brought into operation; owing chiefly to the extraordinary expenses attending the arrangements necessary for the fitting up of the new rooms, and the cost of the new classed Catalogue. It has also been determined that, as the sum thus paid by each member as his composition is found, on an average, to bear a very inadequate proportion to the annual contributions for which it is substituted, this sum shall in future be raised from £40 to £60, to all those Fellows who have not contributed a paper to the Philosophical Transactions; while those who have presented to the Society a paper which has been printed in the Transactions, shall still be allowed the privilege of compounding for the smaller of these sums.

On the subject of the Library the Council have, in the first place, to report that the manuscript of the classed Catalogue is now very nearly completed, and that the printing of it will be very soon commenced.

The Council beg, in the second place, to congratulate the Society on their having, after so much delay, at length obtained possession of the apartments lately occupied as the Exchequer Office, and granted by the Lords Commissioners of His Majesty's Treasury, on the representation made to them by His Royal Highness our President, to the Royal, conjointly with the Astronomical, Society. The apartments retained by the Royal Society are four in number: the first is a room adjoining to the upper library, from which a door has been opened into it, and which has been fitted up with shelves for the reception of the books formerly kept in the rooms on the basement floor of the next house, under the rooms of the Geological Society. The second is a smaller room, communicating by a door with the Council-room. The third is also a small room, opening into the ante-room, on the same floor; and the Council have granted to Mr. Robertson the use of this room, together with coals and candles, and have required of him, in consideration of this favour, to engage to be in attendance, generally, from nine in the morning till five in the afternoon, and also at the evening meetings of the Society. The fourth room is situated on a lower floor.

It having been determined at a former Council, in November of last year, that application should be made to the Lords of the Admiralty to direct the observations made at various stations by their order, to be printed at the public expense; their Lordships have graciously acceded to this request.

The Council, having been applied to by the Commissioners of Excise to undertake the investigation of the proper instruments, and the construction of tables, for ascertaining the strength of spirits, with a view to the more accurate charging of the duty thereon, have appointed a Committee for conducting the proposed inquiry, and fulfilling the objects of the requisition.

The Copley Medal has been awarded by the Council to Professor Plana for his work, entitled "Théorie du Mouvement de la Lune."

The two Royal Medals for the present year have been awarded, the one, on Physics, to John William Lubbock, Esq.; and the other, on Mineralogy and Geology, to Charles Lyell, Esq. The first is for Mr. Lubbock's highly valuable Investigations on the Tides, contained in his papers published in the Philosophical Transactions.

The second is awarded for Mr. Lyell's work, entitled "Principles of Geology," on the following grounds, the Council at the same time declining to express any opinion on the controverted positions contained in that work.

First, The comprehensive view which the author has taken of the subject, and the philosophical spirit and dignity with which he has treated it.

Secondly, The important service he has rendered to science by specially directing the attention of Geologists to effects produced by existing causes.

Thirdly, His admirable descriptions of many tertiary deposits; several of these descriptions being drawn from original observations.

And lastly, The new mode of investigating tertiary deposits, which his labours have greatly contributed to introduce; namely, that of determining the relative proportions of extinct and still existing species, with a view to discover the relative ages of distant and unconnected tertiary deposits.

The Council, being unable to propose any specific Prize-Question for the Royal Medal in Physics for the year 1837, propose to give one of the Royal Medals for that year to the most important unpublished paper in Physics, communicated to the Royal Society for insertion in their Transactions, after the present date and prior to the month of June 1837.

The Council propose to give the other Royal Medals for the year 1837 to the author of the best paper, to be entitled "Contributions towards a system of Geological Chronology, founded on an examination of fossil remains, and their attendant phenomena."

The Treasurer made the following statements with respect to the Number of Fellows, the State of the Finances, and the Receipts and Payments of the Society during the preceding year.

At the last Anniversary, the Society consisted of 747 Members; of whom there were,

11 Royal Personages,

46 Foreign Members, and

690 Home Members.

Since that date, there have died,

17 on the Home List, and

2 on the Foreign List;

and there have been admitted,

40 on the Home List, (with

1 re-admission, and

1 restoration from the Deceased List,) and
0 on the Foreign List. Of whom

20 have compounded for life, and
20 have engaged to pay the Annual Subscription of 4*l.*

The Society therefore now consists of

11 Royal Personages,
44 Foreign Members, and
715 Home Members;

making a total of 770 Members; of whom

602 have compounded for life,
392 at the rate of 2*l.* 6*s.*
210 at the rate of 4*l.*
42 are subject to an annual payment of 2*l.* 12*s.*
71 are subject to an annual payment of 4*l.* 0*s.*

It appeared that the total Receipts for the then closed account, ending November 29, 1834, amounted to 3557*l.* 11*s.* 10*d.*, and the total Disbursements to 3365*l.* 4*s.* 4*½d.*; so that there remained in the Treasurer's hands a balance of 192*l.* 7*s.* 5*½d.* according to the detailed statement printed for the use of the Fellows.

The Treasurer then laid before the Meeting the following

Statement of the Receipts and Payments of the Royal Society between Nov. 29, 1833, and Nov. 29, 1834.

1. RECEIPTS.

	£. s. d.
Balance in the hands of the Treasurer at the last Audit ..	543 9 2
Weekly Contributions, at one shilling	106 12 0
Quarterly Contributions, at £1	212 6 6
Forty Admission Fees	400 0 0
Twenty Compositions for Annual Payments	800 0 0

Rents :—

	£. s. d.
One year's rent of estate at Mablethorpe: due at Michaelmas	107 0 0
One year's rent of premises in Coleman- street: due at Michaelmas	95 0 0
One year's rent of lands at Acton: due at Michaelmas	60 0 0
One year's fee-farm rent of lands in Sus- sex; land-tax deducted: due at Mi- chaelmas	19 4 0
One-fifth of the clear rent of an estate at Lambeth Hill, from the Royal College of Physicians, in pursuance of Lady Sadleir's will: due at Midsummer ..	3 0 0
	<hr/>
	284 4 0
	<hr/>
	2346 11 8

	£. s. d.		£. s. d.
Receipts. Brought forward.....			2346 11 8
Dividends on Stock :—			
One year's dividends on 14,000 <i>l.</i> Reduced			
Annuities 420 0 0			
<i>Pulteney Fund.</i>			
One year's dividends on 200 <i>l.</i> 3 per cent.			
Consols 6 0 0			
<i>Fairchild Fund.</i>			
One year's dividends on 100 <i>l.</i> New South			
Sea Stock 3 0 0			
<i>Rumford Fund.</i>			
One year's dividends on 2161 <i>l.</i> 0 <i>s.</i> 10 <i>d.</i>			
3 per cent. Consols 64 16 8			
<i>Donation Fund.</i>			
One year's dividends on 3820 <i>l.</i> 19 <i>s.</i> 3 <i>d.</i>			
3 per cent. Consols 114 12 6	<u> </u>	608 9 2	
Miscellaneous Receipts :—			
Sale of Philosophical Transactions 534 10 3			
Sale of Abstracts of Papers 67 11 9			
Sale of Sir H. Davy's Discourses 0 9 0			
	<u> </u>	602 11 0	
	Total.....	<u> </u>	<u> </u> £3557 11 10

2. PAYMENTS.

	£. s. d.
<i>Lady Sadleir's Legacy.</i> —The Poor of the Parish, in pursuance of Lady Sadleir's Will.....	3 0 0
<i>Fairchild Lecture.</i> —The Rev. J. J. Ellis, for delivering the Fairchild Lecture of 1834	3 0 0
<i>Donation Fund.</i> —Professor Schumacher, in re-payment for one of Buzengeiger's best Barometers; with additional Tubes and Mercury.....	48 5 2
Mr. Newman, on account, for Standard Barometer	32 7 0
<i>Royal Medals.</i> —Mr. Wyon: for engraving names.....	5 0 0
Salaries :—	£. s. d.
Dr. Roget, one year, as Secretary 105 0 0	
J. G. Children, Esq., one year, as Secre- tary 105 0 0	
Ditto for Index to Phil. Trans. 5 5 0	
C. Konig, Esq., one year as Foreign Se- cretary 20 0 0	
	<u> </u>
Carried forward.....	235 5 0
	<u> </u>
	91 12 2

	£. s. d.	£. s. d.
Salaries :—	Brought forward	235 5 0
Mr. Hudson, one year, as Assistant-Secretary	250 0 0	
Mr. Robertson, one year, as assistant to ditto	100 0 0	
Mr. Gould, one year, as Porter	60 0 0	
	<hr/>	645 5 0
Mr. Robertson : For assisting Mr. Panizzi : One year	54 12 0	
Mrs. Coppard : Gratuity	10 0 0	
Fire Insurance, on the Society's Property	22 11 6	

Bills :—

Taylor :		
Printing the Phil. Trans., 1833, part 2 .	368 16 2	
Printing the Phil. Trans., 1834, part 1 .	154 11 0	
Printing and Paper of Proceedings, Nos. 13, 14, 15, 16, and 2nd Title .	51 3 6	
Miscellaneous Printing: Circulars, Lists of Fellows, Ballot-lists, Statement of Payments, President's Addresses, Minutes of Council, and for Advertisements	123 16 9	
Bowles and Gardiner :		
Paper for the Phil. Trans., 1833, part 2 .	49 0 0	
Paper for the Phil. Trans., 1834, part 1 .	79 16 0	
Paper for the Phil. Trans., 1834, part 2 .	144 4 0	
Basire :		
Engraving and Copper-plate printing for the Phil. Trans., 1833, part 2 . .	70 18 0	
Engraving and Copper-plate printing for the Phil. Trans., 1834, part 1 ..	7 12 6	
Engraving and Copper-plate printing for the Phil. Trans. 1834, part 2 ..	364 0 10	
Engraving and Copper-plate printing of Circulars, Diplomas, and Plates to complete sets	15 19 5	
Vizetelly and Branston :		
Wood Engravings for Phil. Trans. 1833, part 2	21 5 0	
Gyde :		
Sewing 1780 Parts of Phil. Trans. . .	59 6 8	
Boarding 20 Parts of ditto, gilt	2 0 0	
Boarding 50 Sets of Abstracts, 2 vols. 8vo	3 6 8	
Sewing and covering Proceedings, Parts I. and II.—III. 704 copies . .	5 5 6	
	<hr/>	1521 2 0
Carried forward	2345 2 8	

		£. s. d.	£. s. d.
Bills :—	Brought forward.....	6 3 10	2345 2 8
Few & Co., Solicitors		6 3 10	
Tuckett :	Bookbinding : 216 vols. (189, quartos)	53 8 6	
Chappell :	Stationery	16 19 6	
Saunderson :	Shipping expenses	19 8 1	
Arnold and Johnson, Coal-merchants.	42 0 0		
Brecknell and Turner :	Wax Lights, Candles, and Lamp Oil .	58 17 0	
Skelton :	Cleaning Chandeliers ; Fenders ; and repairing Lamps and Locks	10 4 5	
Cubitt :	Builder's work in New Rooms	417 3 0	
Pryer and Spice :	Upright and Sloped Desks.....	3 12 0	
	Cleaning Marble Busts, Mantel-pieces and Picture Frames	4 18 0	
	Travelling Packing Cases for Phil. Trans. &c.	9 6 6	
	Carpet-beating, Table for Library Tea, Bed-hire, and Carpenter's work ..	19 10 6	
Snell :	Picture Rods in Meeting Room	14 12 0	
Cobbett and Son :	Window-cleaning and Glazing	7 3 1	
Guillim :	Soap, large Mats, Brushes, Fire-wood, &c.....	22 1 10	
		<hr/>	705 8 3
Books bought on account of the Money received from the British Museum:			
Baillièvre : Books,—on account	113 5 0		
Simpkin and Marshall : Ditto.....	6 19 2		
Rich : Ditto	1 5 6		
Humboldt's <i>Vues des Cordillères</i>	5 17 0		
		<hr/>	127 6 6
Parish Rates and Petty Charges :			
Taxes and Parish Rates	46 11 7		
Troughton and Simms : Setting off the new Barometer Scale	1 11 6		
Cary : Repairing Thermometer	0 6 6		
Molyneux : Repairing and cleaning Journeymen-clock	1 8 0		
L'Institut Journal	3 1 3		
		<hr/>	<hr/>
Carried forward.....	£ 52 18 10	3177 17 7	

Bills :—		£.	s.	d.	£.	s.	d.
	Brought forward	52	18	10	3177	17	7
	Postage and Carriage	28	6	9			
	Extra Porterage, and delivery of 900						
	Circulars	20	10	10 $\frac{1}{2}$			
	Expenses on Foreign Packets and Pre-						
	sents	7	13	6			
	Stamps	3	9	0			
	Men removing Books in Library.....	9	3	4			
	Charwoman's Wages	12	12	0			
	Extra charwoman's work	3	9	9			
	Board and Wages of Servant	30	0	0			
	Miscellaneous expenses	19	2	9			
					187	6	9 $\frac{1}{2}$
	Balance in the hands of the Treasurer	£	3365	4	4 $\frac{1}{2}$		
					192	7	5 $\frac{1}{2}$
		£	3557	11	10		

December 1st, 1834.

J. W. LUBBOCK, *Treasurer.*

The thanks of the Society were voted to the Treasurer for his able services in attending to its finances.

The statutes relating to the election of Council and Officers were then read by the Secretary; and Joseph Smith, Esq., and William Spence, Esq., being nominated by the President, with the approbation of the Meeting, Scrutators to assist the Secretaries in examining the balloting-lists, the votes of the Fellows present were collected.

Joseph Smith, Esq., having reported, on the part of the Scrutators, the result of the ballot, the following gentlemen were declared duly elected as composing the Council and Officers for the ensuing year; namely,

President: His Royal Highness the Duke of Sussex, K.G.—*Treasurer*: John William Lubbock, Esq., M.A.—*Secretaries*: Peter Mark Roget, M.D.; John George Children, Esq.—*Foreign Secretary*: Charles Konig, Esq.

Other Members of the Council: Charles Frederick Barnwell, Esq.; Henry Thomas De la Beche, Esq.; William Thomas Brande, Esq.; Sir Benjamin Collins Brodie, Bart.; Michael Faraday, Esq.; Henry Holland, M.D.; Rev. Philip Jennings, D.D.; Charles Lyell, jun., Esq.; Herbert Mayo, Esq.; Roderick Impey Murchison, Esq.; Lord Oxmantown; Rev. George Peacock; Rev. Baden Powell; Sir John Rennie; Edward Turner, M.D.; Rev. William Whewell.

The thanks of the Society were then voted to the Scrutators for their trouble in assisting at the election.

THE ROYAL SOCIETY IN ACCOUNT WITH THE BRITISH MUSEUM.

ARUNDEL MANUSCRIPT ACCOUNT.

Dr.	Cr.
	By Cash on account of the following disbursements:—
To Balance.....	386 1 9
	Baillière : Books
	Simpkin and Marshall: Ditto.....
	Rich: Ditto.....
	Humboldt's <i>Vues des Cordillères</i>
	Balance, Dec. 1, 1834
	258 15 0
	<hr/>
	£ 386 1 9